

Climate Change
and Environment
Action Plan of

Ahmedabad District

Executive summary



Prepared By



In Association with



Supported By



The Climate Change and Environment Action Plans (CCEAP) have been developed for multiple districts of India by Vasudha Foundation with support from Shakti Sustainable Energy Foundation. For Ahmedabad, the plan was developed in collaboration with the Climate Change Department, Government of Gujarat and Gujarat Ecological Education and Research (GEER) Foundation, Forests and Environment Department, Government of Gujarat.

The CCEAP aims to complement the State Action Plan on Climate Change (SAPCC) version 2.0 as prescribed by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and align it to India's latest climate change commitments to the United Nations Framework Convention on Climate Change (UNFCCC). The rationale behind this action plan is to follow a bottom-up approach to climate-proof development priorities for the district.

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Cover page images

Top left image:









Torrent power plant, Sabarmati, Ahmedabad (sourced from shutterstock)

Bottom right:

Solar panels over Narmada canal, Vadodara (photograph credit: Climate Change Department, GoG)

Land use map of Ahmedabad district:

Created using data from Landsat 8, secondary data from NRSC/ISRO Bhuvan portal, Google Earth and ORNL-DAAC

 Built-up land	 Crop-land	 Fallow-land	 Forest
 Shrub-land	 Grass-land	 Waste-land	 Water-bodies



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Bhupendra Patel

Chief Minister, Gujarat State

Apro/Jm/2022/01/17/rs

Dt: 17-01-2022

MESSAGE

“The world agrees that lifestyle plays a very important role in Climate Change. I would like to suggest a one-word movement in context of climate which can become a key basis for one world. This word is LIFE – Lifestyle for Environment.”

- **Narendra Modi**

Gujarat is having the only natural habitat and an empire of Asiatic Lions. It has various kinds of ecosystem, ranging from marine biodiversity, inland wetlands, saline deserts to tropical deciduous forest. Being conscious to its varied biodiversity, the State has always been actively engaged in natural resource management, biodiversity conservation and addressing to global environmental threats like Climate Change. Under the visionary leadership of the then Chief Minister of Gujarat and incumbent **Honourable Prime Minister Shree Narendrabhai Modi** has undertaken several innovative initiatives for Climate Change Mitigation Measures.

I am much pleased to learn that with direct consultation of all stakeholders, an all encompassing ‘**Climate Change and Environment Action Plan (CCEAP)**’ of Ahmedabad district has been developed by Vasudha Foundation with support from Shakti Sustainable Energy Foundation and in collaboration with the Climate Change Department and GEER Foundation, Government of Gujarat. I hope the district specific recommendations provided in this well curreted Action Plan are adopted and implemented in Ahmedabad, as this would help Gujarat and in turn India to reach the net-zero target of 2070.

(Bhupendra Patel)

Kiritsinh Rana



No. M/F.&E.C.C.P.S./ 344 /2021

**Minister,
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Printing & Stationery
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Date : - 4 JAN 2022

Message

The state of Gujarat is a front-runner and significantly contributes to the national GDP through various sectors. In addition to this, Gujarat is working to combat climate change and take timely climate mitigation actions. The state currently ranks 1st in solar rooftop installed capacity and contributes to 25% of the total national solar rooftop installed capacity. Moreover, Gujarat also stands 3rd for total installed renewable power in India.

While state level policies and initiatives are being put in place, a first of its kind, Climate Change and Environment Action Plan for Ahmedabad district prepared by Vasudha Foundation will aid the district to effectively contribute in state's climate planning. I would like to congratulate Vasudha Foundation and all its partners for formulating a comprehensive district Action Plan that provides doable short, medium and long-term recommendations for various sectors.

I would encourage the district administration and relevant in-line departments to adopt this Action Plan and take initiatives that are climate cognizant.


(Kiritsinh Rana)

Jagdish Vishwakarma (Panchal)



सत्यमेव जयते

No.Co-Op.C.I.S.I.P.(Ind.)I.F.E.C.C.P.S.(Sta.Mi.) 249 /2021

**Minister of State,
Co-operation, Cottage Industries, Salt
Industries, Protocol (Independent Charge),
Industries, Forest, Environment and
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GOVERNMENT OF GUJARAT

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MESSAGE

Climate change has emerged as a global threat, prompting nations to come together to tackle the challenge. Under the visionary leadership of the Hon'ble Prime Minister, Shri Narendra Modi, India announced its intention to achieve net zero emissions by 2070 at the 26th Conference of Parties (COP26) meet at Glasgow, in November, 2021. India has also vowed to reduce the total projected carbon emissions by one billion tonnes, from now onwards until 2030. To achieve these goals, it is imperative that appropriate actions are undertaken at the state level.

The state of Gujarat is a high performing state in terms of environment management besides leading in development and industrial output. The state ranked first in the Composite Water Management Index 2019 (NITI Aayog) for the third year in a row. Its most populated city, Ahmedabad, was awarded India's 'Cleanest Mega City' in Swachh Survekshan, 2020. The 'SDG India Index and Dashboard 2020-21' by NITI Aayog, applauds Gujarat's performance in attaining the Sustainable Development Goals.

Gujarat was the first state in India and Asia, and globally the fourth to form an independent Department of Climate Change back in 2009. I take pride to say that Government of Gujarat believes in development that is sustainable in nature. I am thus delighted to see that a **Climate Change and Environment Action Plan has been developed for Ahmedabad district**. Developing a plan for the district that factors climate action is a crucial step in the bottom-up approach to meet the state and national climate targets. I am certain that this initiative would set the foundation for tangible actions towards climate conscious development.

I appreciate detailed study undertaken in consultation with various stakeholders to develop the **Climate Change and Environment Action Plan of Ahmedabad district**. I hope to see the implementation of this Action Plan soon.

Jagdish Vishwakarma (Panchal)



Shri S. J. Haider, IAS
Principal Secretary
Climate Change Department
Government of Gujarat

Message

Climate Change Department, Government of Gujarat has been actively engaged for over a decade to effectively address climate change. The concerted actions initiated so far have helped bring forth several innovative initiatives for climate mitigation measures, like the installation of solar panels on Narmada branch canals that help generate clean power, while reducing water loss from evaporation. Gujarat is one of the front-runners in renewable energy growth. It ranks first by contributing 25% of the total national solar rooftop installed capacity. Moreover, the Department undertakes different studies from time to time as well as initiatives to enhance State's measures to combat climate change.

In one such endeavour, the 'Climate Change and Environment Action Plans' (CCEAPs) of Ahmedabad & Rajkot Districts have been developed by Vasudha Foundation in collaboration with the Climate Change Department and GEER Foundation. I appreciate the collective efforts put in, for accomplishing this task.

These district Action Plans recognize that there are no universal solutions for climate change. Therefore, regionally appropriate and district-specific Action Plans have been prepared for both the districts. They take into account the district-level baseline studies on: climate variability and projections, emissions profile and budgetary analysis to estimate climate expenditure, and other crucial aspects. They also bring forth a comprehensive set of recommendations for various climate-relevant sectors and environmental issues of the districts, along with case examples and estimated mitigation potential. These Action Plans, I hope, will be of use and relevance in the exercise of district-level planning to integrate climate action with development activities.

(S. J. Haider)



U. D. Singh, IFS
Director



GEER FOUNDATION

Gujarat Ecological Education and Research Foundation

Message

One of the most challenging threats today is climate change, which has caused regional level disturbances in rainfall, temperature, and extreme events. Countries across the world are realizing the danger posed by this threat and coming together to tackle it. In the most recent Conference of Parties held in Glasgow, India has made many ambitious commitments such as reducing the emissions intensity of its GDP by 45% by 2030 and meeting 50% of its energy requirements from renewable sources in the same timeframe. The most important of announcement was of India to achieve net zero target by 2070.

To meet these targets, particularly net zero by 2070, there is a need to understand the role that forestry sector can play not just as a sink of carbon emissions but also for its myriad ecosystem services for human well-being. The past few Forest Survey Reports have indicated that the recorded forest area in the state of Gujarat, currently standing at 11.03% of the geographical area, has been maintained. Further increase in forest cover, through strategic actions at local level, can reap multiple benefits for the state while combatting climate change in the long term.

In this context, I am pleased to see the efforts made by Vasudha Foundation, in association with the Climate Change Department and GEER Foundation towards developing the 'Climate Change and Environment Action Plan' (CCEAP) for the district of Ahmedabad. The CCEAP is a detailed study of the district and its priorities in alignment with state and national climate goals. The key takeaway from this action plan is a set of comprehensive recommendations, which can enable the district to mainstream climate action and contribute to India's climate goals. I hope the recommendations in the Action Plan are adopted and implemented by the respective departments.


(U.D. Singh)

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MESSAGE

The pervasive effects of Climate Change have been unfolding across the world, more so, in the recent decades. As each year passes, voices from countries around the world, especially the vulnerable ones and those at the brink, have only been growing louder and stronger, advocating robust actions to avoid climate catastrophes. With over one-sixth of world's population, and an extensive coastline of 7516 km, India's role in mainstreaming climate action remains vital. The ambitious targets announced in the recently concluded climate summit at Glasgow, COP26, which include achieving net zero emissions by 2070, stand as a testimony to the country's commitment.

In a federal country like India, the role of each State in contributing towards national goals is instrumental. Gujarat is one of the leading states in the country in terms of climate action, as seen through several initiatives such as the launch of the latest State Action Plan on Climate Change. The state government has also taken a strong stance to reduce emissions from major sources by restricting commissioning of new thermal power plants altogether. The state also has an all-inclusive EV policy (Gujarat Electric Vehicle Policy 2021) which focuses not only on a major shift in the automobile segment from fossil-fuel based to electric, but also on supporting infrastructure.

Ahmedabad is one among the nine cities awarded four-star rating under Climate Smart Cities Assessment Framework, 2021 by the Ministry of Housing and Urban Affairs. The city was also awarded India's 'Cleanest Mega City' in Swachh Survekshan, 2020. The growing developmental needs in the city, and its peripheries within the district calls for comprehensive sectoral level analyses and interventions to curb greenhouse gas emissions. It is thus viewed that, as a first step in this direction, the Climate Change and Environment Action Plan (CCEAP) developed for Ahmedabad district serves its purpose well.

The Action Plan has been developed in consultation with District Administration of Ahmedabad, officials from relevant departments, academia, civil society organizations and other key stakeholders through multiple rounds of consultation. I believe a bottom-up approach such as this, when implemented, would eventually contribute towards achieving the larger goals set by the state and the country.

I appreciate the efforts made towards developing the CCEAP for Ahmedabad district. The recommendations given in this Action Plan can be implemented by the relevant departments for mainstreaming climate action in alignment with the district's development priorities.


(Sandip J. Sagale)

ACKNOWLEDGEMENTS

We would like to thank S.J. Haider, IAS (Principal Secretary), Shwetal Shah (Technical Advisor) and other officials from the Climate Change Department, GoG, and U.D. Singh, IFS (Director), R.D. Kamboj, IFS (Retd.) (former Director), Dr. Sweta Rajpurohit (Manager), and Vibha Goswami (Deputy Director) from GEER Foundation, Forest Department, GoG, as their inputs and support have been vital in development of the Climate Change and Environment Action Plan for Ahmedabad district.

We are obliged to Sandip J. Sagale, IAS (District Collector, Ahmedabad) for support and motivation to accomplish the completion of the action plan for Ahmedabad district.

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We extend our gratitude towards other departments and civil organisations – Anis Mankad, IAS (Special Secretary, Revenue Department), A.B. Gor, IAS (CEA, AUDA), Mahesh Singh, IFS (former MD, UGVCL), R.J Bhrambhatt and Mubina Sheikh (WASMO, Ahmedabad), Kartikeya Sarabhai (Director, CEE), and Mahesh Pandya (Director, Paryavaran Mitra) for inputs and suggestions to refine the action plan.

We are grateful to Dr. Ashwini Kulkarni from IITM, Pune and Dr. Koteswar Rao Kundeti for developing the district climate profile and modelling climate change projections for the district.

We would also like to extend our thanks to participants from various academic institutions, CSOs and line departments who contributed to the development and refinement of CCEAP through their inputs during stakeholder consultations.

We are also grateful to Swati Prasad for proofreading and giving the finishing touches to the manuscript, the team at Aspire Design, New Delhi for designing the final report.

We are thankful to our colleagues from the GIS team, and Energy team at Vasudha Foundation for providing their expertise to assist the research and development of the final action plan.

Last but not the least, we extend our gratitude to Shakti Sustainable Energy Foundation (SSEF), New Delhi, for supporting the endeavour and also to Shubhashis Dey and Aishwarya KS from SSEF.

EXECUTIVE SUMMARY

This Climate Change and Environment Action Plan studies the past, present and the future of the district of Ahmedabad from both the climate and policy perspective to know where the district stands in terms of meeting India's climate commitments. Based on the findings, it evolves concrete recommendations and the way forward for the district collector and other in-line departments.

The ongoing COVID-19 pandemic made it abundantly evident that anthropogenic activities have a far-reaching impact on the environment. On the flip side though, climate action has received a setback. A number of mitigation and adaptation-centric sectors have experienced unforeseen shifts. For instance, an overburdened health infrastructure hasn't been able to accommodate climate-related health issues. Considerable job losses have further diminished the adaptive capacities of the poor and vulnerable. And, there has been a substantial spike in the waste sector emissions with the rise in covid-related waste incineration and increased disposal of single use plastic.

The action plan, therefore, takes a holistic view of the current policies and recommends steps that need to be taken in the short-, medium- and long-term to bring about the necessary changes that are in compliance with India's overall climate goals and commitments.

The key components of this Action Plan are summarised in the chart below:



CLIMATE PROFILE AND PROJECTIONS

This section analyses historical data and projects changes in rainfall and temperature for Ahmedabad district using IMD and NASA's NEX-GDDP datasets, following the multi-modal mean (MMM) approach. Here are some findings for the district:

- **Rainfall expected to increase:** The seasonal rainfall is projected to increase by 8 to 17 percent under RCP4.5 and 13 to 40 percent under RCP8.5 emission scenarios.¹ The number of rainy days is also projected to increase during monsoon, particularly in July and August.
- **Summers are getting hotter:** A significant trend of increase in the maximum temperatures during summer months is seen in the district, which is observed to be accelerated during the last decade. The mean percentage of warm days has shown an increasing trend of around 8 to 10 percent. The minimum temperature has shown an increasing tendency during the season. Cold days show a decreasing trend in the recent decade.
- **Warms days to increase:** Maximum temperatures are projected to increase by about 1.2°C to 2.4°C under RCP4.5 and 1.4°C to 3.5°C under RCP8.5 emission scenarios. In future, the percentage of warm days are also projected to increase by over 45 percent of the present climate. The minimum temperatures also show an increasing trend – the percent of cold days may decrease in all epochs under changing climate conditions.

SECTORAL GREENHOUSE GAS EMISSIONS PROFILE: CLIMATE CHANGE DRIVERS

- **Greenhouse gases have risen by 78 percent since 2005:** Between 2005 and 2019, the total greenhouse gas (GHG) emissions of Ahmedabad district increased by 78 percent (from 5.16 million tonnes CO₂e in 2005 to 9.18 million tonnes CO₂e in 2019) with a CAGR of 4.20 percent. These estimates cover GHG emissions from 13 categories under three major sectors – energy, AFOLU (agriculture, forestry and other land use) and waste.
- **Energy sector is the highest contributor of emissions:** The energy sector (direct fuel combustion in transport, electricity generation, CPP, agriculture, residential etc.) is the highest contributor with 77 percent of total emissions in Ahmedabad district. This is followed by AFOLU (13 percent) and waste (10 percent).
 - ◀ Energy sector emissions have increased by 71.32 percent (from 4.14 Mt of CO₂e in 2005 to 7.09 Mt of CO₂e in 2019) with a CAGR of 3.92 percent.
 - ◀ Public electricity generation and transport are the highest contributors towards energy emissions. This is followed by residential, captive power plants, agriculture and industries.
- **Enteric fermentation and rice cultivation are major contributors to AFOLU emissions:** Emissions from the AFOLU sector have increased at a CAGR of 4.02 percent (by 73.93 percent between 2005 and 2019). Major emission contributors are enteric fermentation and rice cultivation. Increase in forest cover in recent years has added to the sink potential of the Ahmedabad district.
- **Waste sector emissions are growing rapidly:** Although the waste sector has the smallest contribution in economy-wide emissions, it witnessed the highest growth between 2005 and 2019, growing at a CAGR of 7.06 percent. Total waste emissions have increased by 159.85 percent (2005-2019).
- **Business-as-usual scenario will be disastrous:** If no actions/policies are put in place to mitigate the emissions – i.e. the business-as-usual scenario -- the total emissions of Ahmedabad are likely to grow by 96 percent till 2030, with respect to 2015 levels.

ASSESSMENT OF POLICIES THROUGH THE LENS OF CLIMATE CHANGE

A total of 40 major national/state level policies and programmes of energy, AFOLU and waste sector was evaluated for their climate mitigation potential.

- **Power and energy:** Twelve policies/programmes were evaluated. UDAY and PAT schemes were found to be the biggest contributors to GHG mitigation.
 - ◀ Policies related to clean energy generation mitigated 96,000 tCO₂e emissions.

¹ Representative concentration pathways (RCPs) are concentration pathways used by the IPCC. They are prescribed pathways for greenhouse gas and aerosol concentrations, together with land use change that are consistent with a set of broad climate outcomes used by the climate modelling community. The pathways are characterised by the radiative forcing produced by the end of the 21st century. Radiative forcing is the extra heat that will be retained by the lower atmosphere as a result of additional greenhouse gases, measured in watts per square metre (W/m²). There are four RCPs – RCP2.5 (low pathway where radiative forcing peaks at approximately 3 W/m² before 2100), RCP4.5 and RCP6.0 (two intermediate stabilisation pathways in which radiative forcing is stabilised at approximately 4.5 W/m² and 6.0 W/m² after 2100) and RCP 8.5 (high pathway for which radiative forcing reaches greater than 8.5 W/m² by 2100).

- ◀ Policies pertaining to energy-efficient buildings and processes helped avoid 83,31,667 tCO₂e.
 - ◀ Transportation interventions led to emission avoidance of 3,64,361 tCO₂e.
- **AFOLU and cross-cutting:** Twelve policies were assessed
 - ◀ Forestry policies alone led to a mitigation of 16,12,544 tCO₂e emissions.
 - ◀ Policies pertaining to livestock proved to be beneficial for climate action, avoiding 598.97 tCO₂e emissions.
 - ◀ In agricultural sub-sector, impact of only one policy could be computed – the National Food Security Mission added 11,515 tCO₂e emissions.
 - ◀ Policies pertaining to cross-cutting sector helped mitigate 6,79,686 tCO₂e emissions.
- **Waste:** Fifteen policies were assessed.
 - ◀ Policies pertaining to sanitation added 2,29,215 tCO₂e. emissions.
 - ◀ Composting as a part of solid waste management practices mitigated 3,977 tCO₂e emissions.
 - ◀ Domestic wastewater treatment interventions have led to 4,99,332 tCO₂e. emissions.

BUDGETARY ANALYSIS TO ESTIMATE EXPENDITURE ON CLIMATE ACTION

This action plan analyses the district expenditure to estimate spending on climate action. A total of 38 flagship schemes were reviewed to identify those with climate resilience and mitigation relevance. Of these, based on the availability of information across districts as well as relevance to climate actions, five schemes were selected for further analysis.

Table 1: Summary of flagship schemes – budgetary analysis for Ahmedabad district

Scheme	Climate -relevant activities	Year	Total allocation to district under the scheme (in ₹ lakh)	Allocation to climate action (₹ lakh)	% of total scheme budget for climate action at district level*
MGNREGS	Eleven out of 17 activities were identified as climate relevant – drought proofing, fisheries, flood control and protection, land development, micro-irrigation, renovation of traditional water bodies, rural connectivity, drinking water, sanitation, water conservation and water harvesting	2018-19	139009	194.61	14
		2019-20	1,097.77	153.69	
PMKSY	Micro-irrigation activities	2016-17	641	442.29	69
		2019-20	206	142.14	
GIM	Enhancing forest cover, ecosystem restoration, agro-forestry, social forestry, wetland restoration, promoting alternative fuels	2017-18	165.22	165.22	100
		2018-19	107.56	107.56	
		2019-20	39.97	39.97	
AMRUT	Water supply, sewage and septage management, urban transport, drainage, green spaces	2015-16	7,170	4,282.50	54
		2016-17	12,425	6,341.90	
		2017-20	27,128	15,175.60	
DDUGJY + Saubhagya	New sub-stations and upgradation of existing ones, LT lines, feeder segregation, consumer metering, DTR metering etc	Up to April 2020	2,035	1,017	50


*Percentage has been attributed by using Climate Public Expenditure and Institutional Review (CPEIR) methodology of UNDP

RECOMMENDATIONS

The action plan provides comprehensive, sector-wise recommendations from a climate perspective. The aim is to align the district with India's climate commitments through this Climate Change and Environment Action Plan (CCEAP).

The recommendations factor-in state/district vision documents/development plans. They also list the current policies, programmes and schemes and identify concerned departments that can help streamline the actions. This section also provides information on SDGs and other co-benefits that will be addressed through these recommendations. Overall, the mitigation actions suggested in the recommendations can help mitigate 5 Mt CO₂e per annum. The sectoral breakdown of the same is as following:

GHG mitigation potential of CCEAP recommendations (tCO₂e)

 **Energy**
30,54,254

 **AFOLU**
13,66,129

 **Waste**
5,85,044

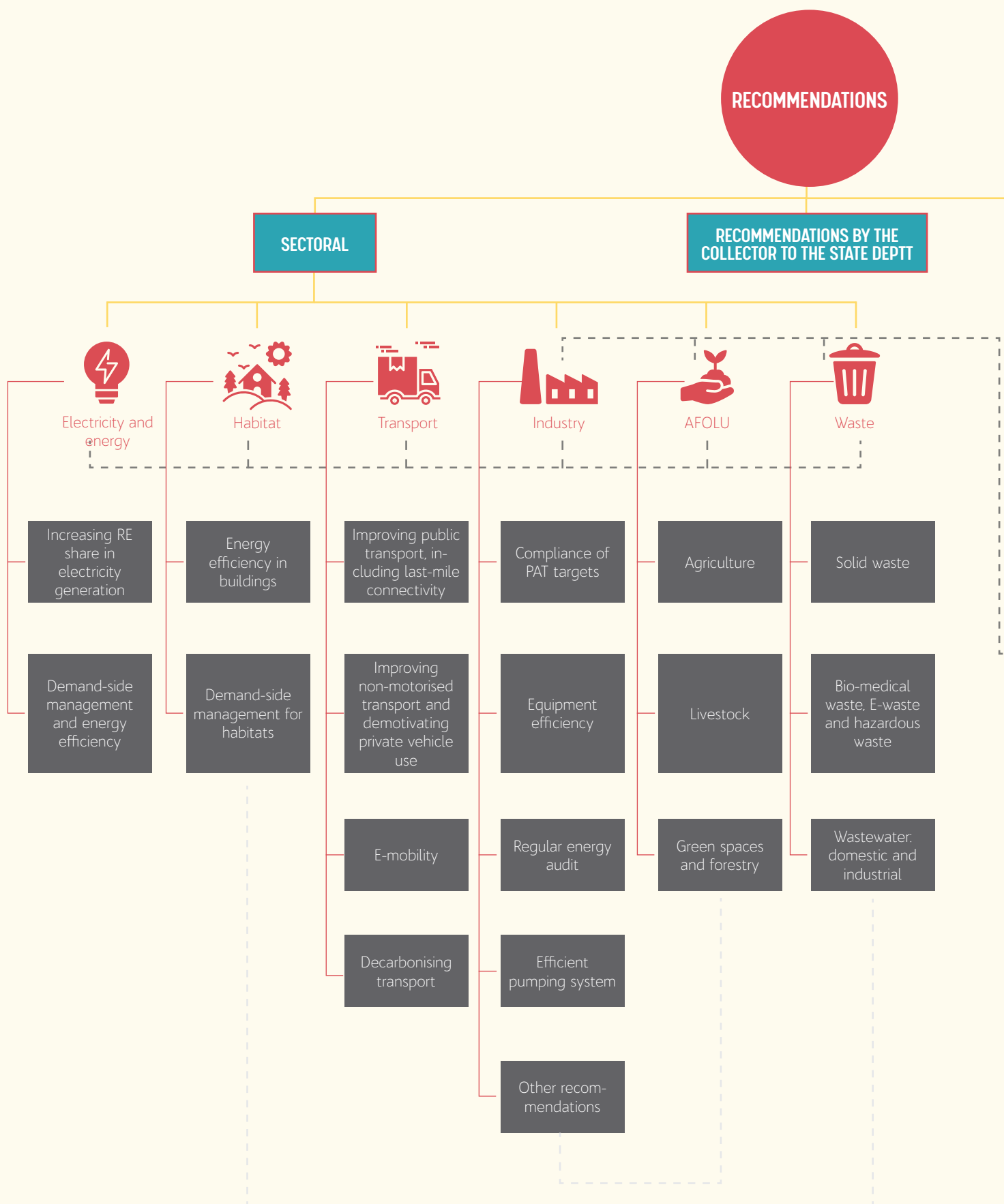


Figure 1: Recommendations for CCEAP Ahmedabad



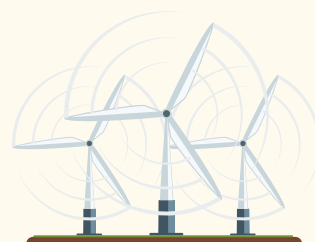
--- : Interlinkages across sectors and sub-sectors (cross-cutting aspects)

Here are some in-brief, sector-wise recommendations:

Power and Energy

Though the energy sector is crucial to achieving India's growth ambitions, it is also responsible for around 70 percent of the country's annual GHG emissions. This calls for a paradigm shift in the energy sector.

Therefore, the action plan recommends (a) increasing the share of RE generation in the district by advancing on-grid and off-grid solar rooftop, ground-mounted installations and other RE installations; (b) encouraging faster penetration of energy-efficient and star-labelled fixtures and upgrading existing power-grid infrastructure to advanced metering infrastructure (in public, institutional and commercial setups); (c) promoting energy efficiency in the residential sector by encouraging the incorporation of ECBC in the building bye-laws, implementation of India Cooling Action Plan, 2018, etc.; and (d) promoting energy conservation in the industrial sector by introducing measures such as a "cap and trade" system for MSMEs at the district level, encouraging industries to follow the Gujarat Industrial Policy, 2020, etc.



Transport

Being one of the fastest growing sectors in India, transport contributes 12 percent to India's total GHG emissions. The action plan recommends (a) promoting e-mobility through awareness, increase of e-vehicles' modal share, transition of public transport (PT) and intermediate public transport (IPT) to electric-powered or hybrid vehicles, developing widespread charging infrastructure, incentivising e-vehicle owners, etc.; (b) ensuring last-mile connectivity and promoting increased use of PT and IPT; (c) augmenting non-motorised transport through dedicated cycle lanes; and (d) improving traffic flow through decongestion and improving road conditions.



AFOLU

For agriculture, forestry and other land use (AFOLU) sector, it's important to promote climate conscious practices that do not have an adverse impact on the ecosystem, biodiversity and natural resource dependent communities. Our recommendations include: (a) promoting the use of organic fertilisers, solar pumps and practices such as micro-irrigation and alternative ways to manage crop-residue under agriculture; (b) having a good mix of high-yield cross-breed cattle and indigenous cattle, and encouraging the use of good quality fodder to bring down enteric fermentation emissions; and (c) maintaining the forest area and the tree cover of Ahmedabad through strict M&E, afforestation in fallow and wasteland, use of alternative funding like CSR, adoption of Miyawaki urban forestry and study on suitability of plantation sites/species, etc. The action plan also recommends involvement of regional agriculture universities to initiate research on high yielding, drought- and temperature-resilient genotypes for various crops, among other measures.



Waste

With waste sector being one of the biggest contributor of methane emissions globally, major recommendations revolve around reducing landfill disposal of waste and managing wastewater to reduce GHG emissions from them through measures such as: (a) reducing waste at source; (b) proper segregation, collection and channelisation of different categories of waste (including bio-medical waste and e-waste) for recycling and treatment; (c) 100 percent conversion of organic waste to compost and gas management of composting units; (d) recycling, recovery and reuse of 100 percent inert waste (plastic, construction waste, etc); and (e) setting up of centralised aerobic wastewater treatment plants with closed sewer networks and periodical sludge removal facility.



Given the unique environmental issues of the district, the action plan also recommends:

1. Adopting a holistic approach to water conservation and wastewater management, including conservation techniques such as rainwater harvesting, net zero water infrastructure, minimising losses in water supply, installing water-efficient fittings, water metering and adoption of inclusive and sustainable water governance.
2. Developing extensive infrastructure to monitor air pollution and suggestions on interventions for preventive measures.
3. The action plan also identifies degradation of Nalsarovar wetland, need for improving sustainability of brick kilns and management of heat stress in the district as key environmental issues and lists recommendations for the same.

COVID-19 IMPACT

This section presents an assessment of how the COVID-19 pandemic has impacted various sectors and the developmental measures. During the national lockdown in 2020, the district saw a 63 percent reduction in electricity generation (between January and August 2020) at the Sabarmati Thermal Power Plant. In agriculture, harvesting activities got interrupted due to the lockdown. The sector also witnessed supply chain problems. However, reverse migration benefitted *kharif* crops with 21.20 percent increase in sown area in the district.

Overall, the pandemic resulted in significant reduction in air pollution due to reduced transport and industrial activities during the lockdown and unlock periods. However, the most impacted sector was waste management with single-use plastic waste and bio-medical waste from both households and healthcare sector increasing manifold, leading to increased incineration, landfilling and single-use product consumption.





Shakti Sustainable Energy Foundation (SSEF) seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following sectors: clean power, energy efficiency, sustainable urban transport, climate policy and clean energy finance.



Vasudha Foundation is a not for profit organization set up in April 2010 with the belief in conservation of Vasudha, which in Sanskrit means the Earth, the giver of wealth and with the objective of promoting sustainable consumption of its bounties.

The core mission is to promote environment -friendly, socially just and sustainable models of energy by focusing on renewable energy and energy efficient technologies and lifestyle solutions. Climate change mitigation is one of the key verticals of the organization. The focus is to bring about reduction in greenhouse gas emissions in the environment and ensure energy efficiency, energy security, energy independence, and sustainable development as well as simultaneously, promoting the concept of "Low Carbon Solutions" and "Green Economies".



Climate Change Department
Government of Gujarat

The Climate Change Department, established in 2009, acts as a bridge within the Government, and between the Government and the Society to address Climate Change. Gujarat is the first and only State in India, the first in Asia and fourth in the world to form an independent department for Climate Change. 'Enabling a low carbon pathway for Gujarat's economic growth that would meet people's aspirations with equity and inclusiveness' is among the department's key objectives. The Department works to address the concerns of Climate Change at State Level by following a multi-pronged strategy, while suitably factoring in National Action Plan on Climate Change (NAPCC), Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), State Action Plan on Climate Change (SAPCC).



Gujarat Ecological Education and Research (GEER) Foundation is an autonomous organization set up in 1982 by the Forests and Environment Department, Government of Gujarat. The Foundation undertakes scientific research and studies on various aspects of ecology and nature conservation, including - wildlife, forests, biodiversity and climate change, together with ecological education and extension. The ecological studies and research carried out by the Foundation have created an important source of scientific information and decision making for the Government and other stakeholders. GEER Foundation is also the designated State Center on Climate Change of Gujarat under the aegis of the DST, MoST, GoI.



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